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## Effect of yogic practices and therapeutic exercise on force vital capacity of person with chronic obstructive pulmonary disease

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### Abstract

**Objective:** The purpose of the study was to find out the effect of yogic and therapeutic exercise on force vital capacity of person with chronic obstructive pulmonary disease.

**Methods:** For the purpose of this study 45 male from Varanasi those who are suffering from COPD (chronic bronchitis) and under treatment process of same at S.S. hospital, IMS, B.H.U was selected purposively as the subject of the study. The age of subjects was ranged between 40 to 50 years. For the study pre-test – Post-test randomized group design was used and involving 45 subjects who were grouped purposively into three groups (15 each). The first group 15 subjects were considered as control group, second 15 subjects were considered as experimental group A (Postural drainage with yogic practices), and last 15 subjects were considered as experimental group B (with postural drainage with therapeutic exercise). Force vital capacity was measured by pulmonary function test or Total lungs function test and scores was recorded in liters.

**Statistical technique:** The data which was obtained from subject was analyzed statistically by the application of analysis of covariance (ANCOVA). The obtained “F” ratio was tested at .05 level of significance.

**Results & Conclusion:** The results of the study showed that there is significant effect of yogic and therapeutic exercise program on Force Vital Capacity. It is concluded that yogic exercise program have better effect for improvement of COPD patients in compare to therapeutic exercise.

**Keywords:** Yogic exercise, therapeutic exercise, force vital capacity & pulmonary function test

### 1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) is a major and increasing global health problem, which is currently the 4<sup>th</sup> commonest cause of death and predicted to become the 5<sup>th</sup> commonest cause of disability in the world by 2020. While there have been major advances in the understanding and management of asthma, COPD has been relatively neglected and there are no current therapies that reduce the inevitable progression of this disease.

COPD is characterized by slowly progressive development of airflow limitation that is poorly reversible, in sharp contrast to asthma where there is variable airflow obstruction that is usually reversible spontaneously or with treatment. The definition of COPD adopted by the Global Initiative on Obstructive Lung Disease (GOLD) for the first time encompasses the idea that COPD is a chronic inflammatory disease and much of the recent research has focused on the nature of this inflammatory response.

COPD includes chronic obstructive bronchiolitis with fibrosis and obstruction of small airways, and emphysema with enlargement of airspaces and destruction of lung parenchyma, loss of lung elasticity and closure of small airways. Chronic bronchitis, by contrast, is defined by a productive cough of more than 3 months duration for more than 2 successive years; this reflects mucus hypersecretion and is not necessarily associated with airflow limitation. Most patients with COPD have all three pathological mechanisms (chronic obstructive bronchiolitis, emphysema and mucus plugging) as all are induced by smoking, but may differ in the proportion of emphysema and obstructive bronchiolitis. In developed countries cigarette smoking is by far the commonest cause of COPD accounting for over 95% of cases, but there are several other risk factors, including air pollution (particularly indoor air pollution from burning fuels), poor diet, and occupational exposure. COPD is characterized by acceleration in the normal decline of lung function seen with age.

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The slowly progressive airflow limitation leads to disability and premature death and is quite different from the variable airway obstruction and symptoms in asthma, which rarely progresses in severity.

**2. Methodology**

For the purpose of this study 45 male from Varanasi those who are suffering from COPD (chronic bronchitis) and under treatment process of same at S.S. hospital, IMS, B.H.U was selected purposively as the subject of the study.

The age of subjects was ranged between 40 to 50 years. For the study pretest – posttest randomized group design was used and involving 45 subjects who were grouped purposively into three groups (15 each). The first group 15 subjects were considered as control group, second 15 subjects were considered as experimental group A (Postural drainage with yogic practices), and last 15 subjects were considered as experimental group B (with postural drainage with therapeutic exercise).

<b>Control Group</b>	<b>O1</b>		<b>O2</b>
Yogic Group	O3	T1	O4
Therapeutic exercise Group	O5	T2	O6

O = Observation, T = Treatment

Force vital capacity was measured by pulmonary function test or Total lungs function test and scores was recorded in liters. The experiment group A was taken 6 weeks yogic exercise training, in this training program only Pranayama exercise performed by subjects. The experimental group B was taken 6 weeks therapeutic exercise, in this program only breathing exercise performed by the subjects. The data which was obtained from subject was analyzed statistically by the application of analysis of covariance (ANCOVA).

The obtained “F” ratio was tested at .05 level of significance.

**2.1 Findings**

The data are analyzed and the results pertaining to Descriptive Statistics of Experimental Group (Yogic and therapeutic exercise group) and Control Group in relation to Force Vital Capacity are presented with the help of table 1.

**Table 1:** Descriptive Statistics of Yogic exercise group, Therapeutic exercise group and Control Group in relation to Force Vital Capacity

		N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Pre-test	Yogic Group	15	1.87	0.15	0.03	1.60	2.20
	Therapeutic Group	15	1.83	0.14	0.03	1.60	2.00
	Control Group	15	1.78	0.19	0.05	1.40	2.10
Post-test	Yogic Group	15	2.04	0.16	0.04	1.70	2.40
	Therapeutic Group	15	2.04	0.14	0.03	1.80	2.30
	Control Group	15	1.86	0.20	0.05	1.40	2.10

Table 1 clearly indicates that the mean and standard deviations of force vital capacity at different groups (yogic exercise group, therapeutic exercise group, and control groups). The observed mean and standard deviation of pre-test, force vital capacity of yogic exercise group 1.87±0.15, Therapeutic exercise group 1.83±0.14 & control group 1.78±0.19; and Post-test, force vital capacity of yogic

exercise group 2.04±0.16, Therapeutic exercise group 2.04±0.14, & Control group 1.861±0.20 are respectively. The data are further analyzed with the help of analysis of variance to find out the significance difference between means of pre-test and Post-test of yogic exercise group, therapeutic exercise group and control group in relation to force vital capacity. The results are presented in the table no 2.

**Table 2:** Analysis of Variance of Comparison of Means of Yogic exercise group, Therapeutic exercise group and Control Group in Relation to Force Vital Capacity

	Source of variance	Sum of Squares	df	Mean Square	F	Sig.
Pre-test	Between Groups	0.056	2	0.0282	1.005	.375
	Within Groups	1.180	42	0.0280		
	Total	1.236	44			
Post-test	Between Groups	0.312	2	0.156	5.099*	.010
	Within Groups	1.287	42	0.031		
	Total	1.599	44			

Table 2 revealed that, the pre-test obtained ‘F’ value of 1.005 is found to be no significant at 0.05 level, which is clearly indicated that there are no significant difference and explains the random assignment of subjects to yogic exercise group, Therapeutic exercise group and control

group is quite successful. In relation to Post-test, significant difference is found among yogic exercise group, Therapeutic exercise group and control group pertaining to force vital capacity, since obtained ‘F’ value of 5.099 is found significant at 0.05 level.

**Table 3:** Adjusted Post-test means of yogic exercise group, Therapeutic exercise group and control group in relation to force vital capacity

Groups	Mean	Std. Error
Yogic Group	2.002	0.024
Therapeutic Group	2.045	0.024
Control Group	1.906	0.024

From the table 3, it is revealed that mean of yogic exercise group is 2.002 with the standard error of 0.024 and mean of therapeutic exercise group is 2.045 with the standard error of 0.024, whereas the mean of control group is 1.906 with the standard error of 0.024. The data are analyzed and the

results pertaining to analysis of co-variance among yogic exercise group, Therapeutic exercise group and control group of COPD person in relation to force vital capacity for pre-test -Post-test respectively and the results are presented in table 4.

**Table 4:** Analysis of Covariance of Comparison of Adjusted Post-test means of yogic exercise group, Therapeutic exercise group and Control Group in relation to Force vital capacity

	Sum of Squares	df	Mean Square	F	Sig.
Contrast	0.147	2	0.073	8.820*	.001
Error	0.342	41	0.008		

Table 4 revealed that, the obtained 'F' value of 8.820 is found significant at 0.05 levels. This result indicates that the treatment (yogic and therapeutic exercise) is given to

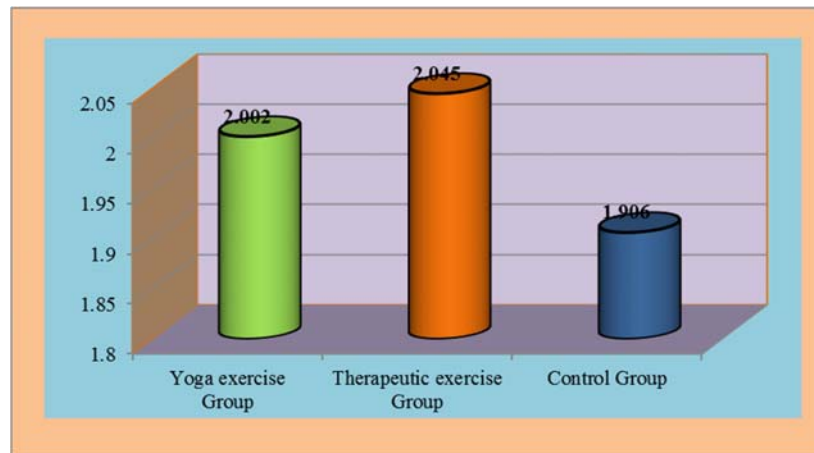
subjects has increase force vital capacity of subjects, but which treatment group is better to other treatment group, LSD post hoc test is applied.

**Table 5:** LSD Post-hoc Test for the comparison of paired means of yogic exercise group, Therapeutic exercise group and Control Group in relation to Force Vital Capacity

(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.
Control	yogic	0.096*	0.034	0.008
	therapeutic	0.138*	0.034	0.000
yogic	therapeutic	0.042	0.034	0.212

It is evident from table 5 that significant difference is found between adjusted final mean scores of control group & yogic exercise group and control group & therapeutic exercise group. The no significant difference is found between adjusted final mean score of Yogic exercise group and therapeutic exercise group; it is evident that both yogic

and therapeutic exercise program have same effect on force vital capacity of subjects. The Graphical representation of mean of yogic exercise group, therapeutic exercise group and control group in relation to force vital capacity is presented with the help of figure 1.



**Fig 1:** The Graphical representation of mean scores of yogic exercise group, therapeutic exercise group and control group in relation to force vital capacity

**3. Discussion of Findings**

Breathing is the source of our life energy. Inspiration has a much wider meaning than just taking in air: it also means being creative, in a very deep, complex sense. Expiration not only means exhaling air; it is relaxation, letting go, finally also letting go of life. This link between life, death, and breath has been considered by many religions and philosophical systems. In the present study, there is significant effect of yogic exercise and therapeutic exercise program on Force Vital Capacity. Significant difference between the adjusted means of the control group and yogic exercise group on the data of Force Vital Capacity during Post-testing. Significant difference between the adjusted means of the control group and therapeutic exercise group on the data of Force Vital Capacity during Post-testing. No

significant difference between the adjusted means of the yogic group and therapeutic exercise group on the data of Force Vital Capacity during Post-testing. In the present study, there was increase in FVC following practice of yogic exercise for 6 weeks. The improvement in pulmonary function can be attributed to practice of pranayama like kapalabati, Anulom-Vilom, Ujjayi etc. These practices increase muscular strength and endurance of muscles in the thoracic cage, in turn improving the lung performance. Practice of yogic exercise helps in reducing the heart rate and blood pressure. It improves blood supply to organs, thereby increasing oxygenation, and removing the metabolic waste from the body. The reduced heart rate and blood pressure are due to the decreased sympathetic activity with a shift in the autonomic balance towards

parasympathetic dominance. Decreased sympathetic tone causes vasodilation and increases the blood supply to various tissues in the body. Pranayama increases oxygen saturation, enhances the aerobic metabolism in the body. Due to increased blood flow, body is able to remove the metabolic waste more effectively. Practice of asanas enhances the efficiency of skeletal muscles. They perform better with effective utilization of the oxygen and nutrients. Thus the load on the heart and respiratory systems are reduced. These physiological adaptations improve the work performance of the COPD patients practicing yogic exercise. Therapeutic exercise also performance same aspect of physiological functions of COPD Patients and improve force vital capacity of subjects. The result of the study is in consonance with the findings of Vinay A V & Venkatesh D (2014), to assess the influence of short term practice of yoga for a month on Heart rate variability (HRV) and pulmonary function test. Twenty two healthy female volunteers in the age group of 30-60 years who practiced yoga for a month were included in the study. Heart rate variability was assessed by using HRV device (RMS Vagus, India) and pulmonary functions were assessed by computerized spirometry (Resped Spirobank G, MIR SRL, Italy). Pre interventional assessment of HRV and spirometry was done in these subjects. Practice of yoga that included a set of physical postures (asanas), breathing techniques (pranayama) and meditation (dhyana) done for duration of one month under the guidance of a certified yoga instructor. Post interventional assessment of HRV and spirometry was done. Statistical analysis was done to compare the changes using paired t test and Wilcoxon sign ranked test. There was a significant reduction in low frequency (LF) component of HRV from 31.25 (20.5-39.28) to 26.15 (17.57 - 29.30) and increase in Forced Vital Capacity (FVC), Forced expiratory volume in one second (FEV1) and Peak expiratory flow rate (PEFR) from  $94.46 \pm 13.55$  to  $96.31 \pm 14.27$ ,  $93.46 \pm 15.32$  to  $95.73 \pm 16.48$  and  $79.96 \pm 15.5$  to  $85.38 \pm 18.45$ . ( $p < 0.05$ ). Yoga on regular practice for a month improves Cardio-respiratory health in healthy females.

#### 4. Conclusions

On the basis of the interpretation of data the following conclusion were drawn from this study.

- It is concluded that there is significant effect of yogic and therapeutic exercise program on Force Vital Capacity.
- 1. It is concluded that there is a significant difference between the adjusted means of the control group and yogic exercise group on the data of Force Vital Capacity during Post-testing.
- 2. It is concluded that there is a significant difference between the adjusted means of the control group and therapeutic exercise group on the data of Force Vital Capacity during Post-testing.
- 3. It is concluded that there is no significant difference between the adjusted means of the yogic exercise group and therapeutic exercise group on the data of Force Vital Capacity during Post-testing.

#### 4.1 Practical Applications

The results of this study provide insight into yogic and therapeutic exercise program for improvement of force vital capacity of COPD patients. However COPD patients are suffering from breathing problem in during period of

disease. This research paper provides better knowledge for improvement of COPD patients through Yogic exercise and therapeutic exercise program.

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